Engineering Evaluation
Edward Avenue LLC, Plant # 17410
Application Number 13656

Background

On behalf of Edward Avenue LLC, Levine-Fricke LFR Inc has applied for an AC/PO for equipment necessary for soil remediation at the site located at the former Golden Technology Inc at 3465 and 3475 Edward Avenue in Santa Clara Ca. Treatment will consist of a dual phase extraction (DPE) system (equipment consisting of a soil vapor extraction unit (SVE)/ groundwater (GW) treatment unit). The dual phase soil vapor extraction (DPE) system will use a 300 CFM liquid ring blower to extract soil vapor and groundwater from the subsurface. The extracted groundwater chemicals will be transferred to the vapor phase by utilizing a knock-out drum. The water collected from the knockout tank will be collected and disposed of in accordance with the local POTW requirements. The vacuum unit is also equipped with a water knockout vessel, inlet filter, dilution air valve, recirculation valve, and flow indicators. Vapor abatement will be achieved by Carbon Adsorption (Carbon). The Carbon adsorption system will consist of two 1000 pounds minimum capacity activated carbon vessels connected in series.

The Carbon unit influent and effluent VOC concentrations will be monitored with a portable flame-ionization detector (OVA-FID) on a schedule reflecting current loading rates and predicted Carbon capacity. To ensure proper operation of equipment and verify attainment of steady-state conditions, Carbon performance will be monitored daily for the first five days. Levine-Fricke LFR Inc. may then elect to change their monitoring schedule based on measured influent concentrations and calculated carbon loading. Monitoring schedule changes will be allowed only after District review of concentration measurements and subsequent receipt of District approval.

This source is located within 1,000 feet of the outer boundary of Montague Elementary School, and as such this application requires Public Notification via Reg. 2-1-412. A Public Notice was prepared and sent out to the home address of the students of the school and to each address within a radius of 1,000 feet of the source.

Emission Calculations

For a conservative estimate of yearly emissions, we shall assume that the Thermal Oxidizer is operated for the entire year with an inlet concentration corresponding to the initial soil concentration level. Generalized assumptions follow:

* Operating conditions: Pressure = 1 Atm; Inlet Temperature = 21^{o}C; (V/n =RT/P) 387 ft^3.

- Influent values based on operational parameters of equipment and applicant supplied soil vapor test results: influent rate 300 scfm throughout; maximum influent concentration = 301 ppmv NPOCs, and 301 ppm POCs; destruction efficiency = 98.5 % throughout.
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Emissions of Precursor Organic Compounds:

$$301E\text{-}6 * \frac{300\ ft^3}{min} * \frac{1440\ min}{1\ day} * \frac{lb\ mole}{386\ ft^3} * \frac{131.4\ lb}{lb\ mole} * (1 - 0.985) = \textbf{0.662 lbm/day} \text{ (abated)}$$

Emissions of Non Precursor Organic Compounds:

$$301E\text{-}6 * \frac{300\ ft^3}{min} * \frac{1440\ min}{1\ day} * \frac{lb\ mole}{386\ ft^3} * \frac{165.8\ lb}{lb\ mole} * (1 - 0.985) = \textbf{0.836 lbm/day} \text{ (abated)}$$

Emissions of Toxic Air Contaminants (PERC):

301E-6 * $\frac{300 ft^3}{min} * \frac{1440 min}{1 day} * \frac{1 lb mole}{386 ft^3} * \frac{165.8 lb}{lb mole}$ * (1 - 0.985) = **0.836 lbm/day** (abated PERC)

301E-6 * $\frac{300 ft^3}{min} * \frac{1440 min}{1 day} * \frac{1 lb mole}{386 ft^3} * \frac{131.4 lb}{lb mole}$ * (1 - 0.985) = **0.662 lbm/day** (abated TCE)

Compounds	Lbm/day	Lbm/yr	Tons/yr
NPOCs	**0.836**	**305.01**	**0.153**
POCs	**0.662**	**241.72**	**0.121**

Emissions of Air Contaminants: ppm provided by consultant in air (rounded up)

Chemicals	MW	PPM (V)	Unabated emissions lbm/day	Abated Emissions lbm/day	Abated Emissions lbm/yr	Abated Emissions tons/yr
TCE	131.4	52	7.627	0.076	27.84	0.0139
*PCE	165.8	1	0.185	0.002	0.68	0.0003
Cis 1,2 TCE	96.95	6	0.649	0.007	2.37	0.0012

Toxics

Under the trigger levels as per Regulation 2-1-316, the emissions of toxic substances (vinyl chloride, tetrachloroethylene, trichloroethylene, etc.) are not considered sufficient to warrant a Risk Screen Analysis. For tetrachloroethylene the trigger level is 30 lbs/yr, and for trichloroethylene the trigger level is 91 lbs/yr. In accordance with Regulation 2 Rule 5, the impact is then insignificant since this risk is within the threshold of 10 in a million as required for sources implementing TBACT; therefore, the Toxics Section has recommended the issuing of this A/C with a tetrachloroethylene emission limit of **30 lbs/yr** and a trichloroethylene emission limit of **91 lbs/yr**.

New Source Review

This proposed project will not emit over 10 lbs per highest day and is therefore not required to implement BACT; however the facility will comply with TBACT. For Soil Vapor Extraction operations and groundwater treatment units, BACT is defined as attainment of set destruction efficiencies corresponding to set influent concentration values. Operation of the Carbon vessels will be conditioned to ensure attainment of the following required destruction efficiencies: $\geq$98.5% if inlet POC $\geq$2000; $\geq$97% if inlet POC $\leq$2000 to >200 ppmv; $\geq$90% if inlet POC <200 ppmv. Offsets need not be imposed as annual emissions will not exceed 10 tons. BACT, Offsets, PSD, NSPS, and NESHAPS are not triggered.

CEQA

The project is considered to be ministerial under the Districts proposed CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors and therefore is not discretionary as defined by CEQA. This project is in compliance with Chapter 9.1 of the permit handbook.

Compliance

Based on the information submitted, this operation is expected to be in compliance with Regulation 8-47-301, Emission Control Requirements, Specific compounds, and 8-47-302, Organic compounds. The POC emissions will be vented through a Carbon adsorption system at all times of operation

This project is within 1,000 ft from the nearest public school and is therefore subject to the public notification requirements of Regulation 2-1-412.

Recommendation

Recommend that a conditional Authority to Construct be issued for source:

S-1: Dual Phase Soil Vapor Extraction System consisting of a 300 max scfm blower, and ancillary equipment, abated by A-1, Dual Phase Extraction Abatement System, consisting of at least two (200 lb minimum capacity) Carbon Adsorption Vessels arranged in series.

Conditions

1. Both Precursor Organic Compound (POC) emissions and NPOC emissions from Source S-1 shall be abated by abatement device A-1, Dual Phase Extraction Abatement system consisting of 2 carbon canisters in series during all periods of operation. Soil vapor flow rate shall not exceed 300 scfm.

2. The POC and NPOC abatement efficiency of abatement device A-1 shall be maintained at a minimum of 98.5% by weight for inlet concentrations greater than or equal to 2000 ppmv (measured as C_6). For inlet concentrations below 2000 ppmv and greater than or equal to 200 ppmv, a minimum abatement efficiency of 97% shall be maintained. For inlet concentrations below 200 ppmv, a minimum abatement efficiency of 90% shall be maintained. The minimum abatement efficiency shall be waived if outlet concentrations are shown to be less than 10 ppmv (measured as C_6). All chemical constituents will be required to report emissions of each compound in pounds per year to ensure that compounds do not exceed the trigger levels of Table 2-5-1 (Regulation 2-Rule 5).

Table 2-5-1 Toxic Air Contaminant Trigger Levels

Compound	**Trigger level lbm/yr**
Trichloroethylene	91
Tetrachloroethylene	30

3. To determine compliance with conditions #1 and #2, within 24 hours after start-up of the two carbon canisters in series, the operator of this source shall:
    a. Analyze the inlet gas stream to determine the vapor flow rate and concentration of POC and NPOC present.
    b. Analyze the exhaust gas to determine the flow rate, and the concentrations of all chemical constituents present including the following compounds: cis 1,2 dichloroethylene, trichloroethylene, and tetrachloroethylene.
    c. Calculate the emission rate of all compounds in pounds per day based on the exhaust gas analysis and the operating exhaust flow rate. The soil vapor flow rate shall be decreased, if necessary to demonstrate compliance with Condition #2.

d. Calculate the POC and NPOC abatement efficiency based on the inlet and exhaust gas sampling analysis. For the purpose of determining compliance with condition #2, the POC and NPOC concentration shall be reported as hexane.
e. Submit to the District's Permit Services Division the test results and emission calculations within one month from the testing date. Samples shall be analyzed according to modified EPA test method 8260B or their equivalent to determine the concentrations of halogenated and nonhalogenated hydrocarbons including the following compounds: (cis 1,2 dichloroethylene, trichloroethylene, tetrachloroethylene,).

4. Within 30 days after the end of every calendar year, the operator of this source shall provide the assigned Plant Engineer in the Permit Services Division a year end summary showing the following information.
   a. The location at which the equipment was operated including the dates operated at each location.
   b. The total throughput of contaminated soil vapor for the previous four quarters (indicated in cubic feet).
   c. The total emissions for halogenated and nonhalogenated compounds including the following (cis 1,2 dichloroethylene, trichloroethylene, tetrachloroethylene) for the previous four quarters (indicated in pounds per year).

5. The operator shall maintain a file containing all measurements, records and other data that are required to be collected pursuant to the various provisions of this conditional Authority to Construct/Permit to Operate. All measurements, records and data required to be maintained by the operator shall be retained for at least two years following the date the data is recorded.

6. Any non-compliance with these conditions shall be reported to the Compliance and Enforcement Division at the time that it is first discovered. **The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well as the time of occurrence.**

7. During operation of the Activated Carbon Vessels, the operator of this source shall monitor with a photo-ionization detector (PID), flame-ionization detector (FID), or other method approved in writing by the District's Source Test Manager at the following locations:

   a. At the inlet to the second to last Carbon vessel in series.
   b. At the inlet to the last Carbon vessel in series.
   c. At the outlet of the Carbon vessel that is last in series prior to venting to the atmosphere.

   When using an FID to monitor breakthrough, readings may be taken with and without a Carbon filter tip fitted on the FID probe. Concentrations measured with the Carbon filter tip in place shall be considered methane for the purpose of these permit conditions.

8. These monitor readings shall be recorded in a monitoring log at the time they are taken. The monitoring results shall be used to estimate the frequency of Carbon change-out necessary to maintain compliance with conditions number 9 and 10, and shall be conducted on a daily basis. The operator of this source may propose for District review, based on actual measurements taken at the site during operation of the source, that the monitoring schedule be changed based on the decline in organic emissions and/or the demonstrated breakthrough rates of the carbon vessels. Written approval by the District's Engineering Division must be received by the operator prior to a change to the monitoring schedule.

9. The second to last Carbon vessel shall be immediately changed out with unspent carbon upon breakthrough, defined as the detection at its outlet in excess of the higher of the following limits:

   a. 10 % of the inlet stream concentration to the carbon bed.
   b. 10 ppmv (measured as C_6).

10. The last Carbon vessel shall be immediately changed out with unspent Carbon upon detection at its outlet of 10 ppmv or greater (measured as C_6).

11. The operator of this source shall maintain the following information for each month of operation of the Activated Carbon Vessels:

a. Hours and time of operation.
b. Each emission test, analysis or monitoring results logged in for the day of operation they were taken.
c. The number of Carbon vessels removed from service.

Such records shall be retained and made available for inspection by the District for two years following the date the data is recorded.

12. Upon final completion of the remediation project, the operator of Source S-1 shall notify the Engineering Division within two weeks of decommissioning the operation.

by_____ date_____

Irma Salinas
Air Quality Engineer II